	A	B	C	D	E	F	G	H
1	**Appendix B: Emissions Calculations**							
2	**Summary of Modification**							
3								
4	**Company Name:**	**MGPI of Indiana, LLC**						
5	**Address:**	**7 Ridge Avenue, Lawrenceburg, Indiana 47025**						
6	**Significant Source Modification No.:**	**029-35496-00005**						
7	**Significant Permit Modification No.:**	**029-35505-00005**						
8	**Reviewer:**	**Kristen Willoughby**						
9	**Date:**	**12/22/2014**						
10								
11	**Uncontrolled Potential to Emit (tons/yr)**							
12	**Emission Unit**	**PM**	**PM10**	**PM2.5 ***	**SO_2**	**NOx**	**VOC**	**CO**
13	One (1) DDG Dryer, identifed as EU-39	418.77	418.77	418.77	18.84	27.86	418.77	464.28
14	Wet Pad (EU-40)	-	-	-	-	-	0.89	-
15	2 Screw Conveyors, 1 Drag Conveyor, 3 Product Conveyors, 1 K-Valve	2.55	1.42	0.24	-	-	-	-
16	**Total**	**421.32**	**420.19**	**419.01**	**18.84**	**27.86**	**419.66**	**464.28**
17	** PM2.5 listed is direct PM2.5*							

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12	**Total HAPs**
13	39.36
14	0.04
15	-
16	**39.40**
17	

Appendix B: Emissions Calculations

Summary of Emissions

Company Name: MGPI of Indiana, LLC

Address: 7 Ridge Avenue, Lawrenceburg, Indiana 47025

Significant Source Modification No.: 029-35496-00005

Significant Permit Modification No.: 029-35505-00005

Reviewer: Kristen Willoughby

Date: 12/22/14

	Emissions (ton/yr)								
	Process/Emission Unit	**PM**	**PM10**	**PM2.5**	**SO2**	**NOx**	**VOC**	**CO**	**GHG**
	PTE (New Units)								
	DDG Dryer (EU-39)	8.38	8.38	8.38	18.84	27.86	8.38	46.43	27,473
	Wet Pad (EU-40)	-	-	-	-	-	0.89	-	-
	PTE	**8.38**	**8.38**	**8.38**	**18.84**	**27.86**	**9.27**	**46.43**	**27,473**
	Actual to Potential (DDG Cooler and Transport System EU-32)								
	Baseline	0.00	0.00	0.00	-	-	0.00	-	-
	PTE	7.91	5.01	2.01	-	-	9.16	-	-
	Emissions Increase (ATPA)	**7.91**	**5.01**	**2.01**	**-**	**-**	**9.16**	-	-
	Actual to Projected Actual (EU-32 Rotary Dryers)								
	Baseline	21.45	21.45	21.45	-	-	635.51	-	-
	Projected Actuals	19.85	19.85	19.85	-	-	587.94	-	-
	Emissions Increase (ATPA)	**<0**	**<0**	**<0**	**-**	**-**	**<0**	-	-
	Hybrid Test								
	Total PTE New Units	8.38	8.38	8.38	18.84	27.86	9.27	46.43	27,473
	Total Emissions Increase from ATPA	7.91	5.01	2.01	-	-	9.16	-	-
	Hybrid Test Emissions Increase	**16.29**	**13.38**	**10.39**	**18.84**	**27.86**	**18.42**	**46.43**	**27472.88**
	PSD Significant Threshold	**25**	**15**	**10**	**40**	**40**	**40**	**100**	**75,000**

PM2.5 Net Emissions (ton/yr)	
Hybrid Test increase	**10.39**
Contemporaneous Netting	
EU-32 Rotary Dryers - Baseline	21.45
EU-32 Rotary Dryers - Projected Actuals	19.85
Contenporanous Decrease - EU-32 Rotary Dryers	**-1.61**
AA 029-32386-00005 (issued 12/17/12) - add 3 boilers	
3 Boilers - Baseline	0.00
3 Boilers - Projected Actual (PTE)	0.41
Contemperaneous Increases from 3 Boilers	**0.41**
Renewal T029-32119-00005 (issued 06/20/14) - remove 3	
3 Boilers - Baseline (PTE)	0.41
3 Boilers - PTE	0.00
Projected Decrease from 3 Boilers	**-0.41**
Emissions Increase	8.78
PSD Significant Threshold	10

Note: Baseline emissions for the DDG Cooler and Transport System are assumed to be zero. The transport system has new units being added.
MGPI's production is bottlenecked at the existing stills which are not being modified. Any increase in production could have been accommodated with the existing dryers.
Pursuant to 326 IAC 2-2(e)(3), the baseline emissions for a new emissions unit after intial construction shall be equal to the PTE. Pursuant to 326 IAC 2-2(t)(1), a new emissions unit is any emissions unit that has exisited less than 2 years.

Appendix B: Emissions Calculations
DDG Dryer (EU-39)

Company Name: MGPI of Indiana, LLC
Address: 7 Ridge Avenue, Lawrenceburg, Indiana 47025
Significant Source Modification No.: 029-35496-00005
Significant Permit Modification No.: 029-35505-00005
Reviewer: Kristen Willoughby
Date: 12/22/2014

Combustion Source	Hourly MMBtu/hr	Annual MMBtu/yr	Heat Content (Btu/scf)	Fuel Usage (MMcf/yr)
Direct-fired Dryer Heat Input Capacity[a]	45	394,200	1,020	386.47
RTO Heat Input Capacity[a]	8	70,080	1,020	68.71
Total Heat Input Capacity	53	464,280		455.18

Production Capacity	ton/hr	ton/yr
~~Short-term Distillers Dry Grain (DDG) Production~~[b]	9.56	83,754

	Pollutant	Control Efficiency
Control Efficiency For Criteria Emissions (% Removal)[c]	HAPs	97%
	VOC	98%
	CO	90%
	$PM/PM_{10}/PM_{2.5}$	98%

Emissions From DDG Drying (EU-39)	Pollutant	NOx		CO		SO_2		VOC		PM		PM_{10}		$PM_{2.5}$	
	Uncontrolled Emission Factor	0.12 lbs/MMBtu		2.0 lbs/MMBtu		0.45 lbs/ton DDG		10.0 lbs/ton DDG		10.0 lbs/ton DDG		10.0 lbs/ton DDG		10.0 lbs/ton DDG	
	Units	lbs/hr	tpy	lbs/hr	tpy	lbs/hr	tpy	lbs/hr	tpy	lbs/hr	tpy	lbs/hr	tpy	lbs/hr	tpy
Uncontrolled PTE		6.36	27.86	106.00	464.28	4.30	18.84	95.61	418.77	95.61	418.77	95.61	418.77	95.61	418.77
Controlled PTE		-	-	10.60	46.43	-	-	1.91	8.38	1.91	8.38	1.91	8.38	1.91	8.38

HAP Emissions From DDG Drying (EU-39)	Pollutant	Acetaldehyde		Formaldehyde		Acrolein		Methanol		Total HAP (from Natural Gas Combustion)		Total HAP Emissions[e]	
	Uncontrolled Emission	0.5 lbs/ton DDGS		0.31 lbs/ton DDGS		0.01 lbs/ton DDGS		0.11 lbs/ton DDGS		See Below			
	Units	lbs/hr	tpy	lbs/hr	tpy	lbs/hr	tpy	lbs/hr	tpy	lbs/hr	tpy	lbs/hr	tpy
Uncontrolled PTE		4.78	20.94	2.96	12.98	0.10	0.42	1.05	4.61	0.09	0.41	8.99	39.36
Controlled PTE		0.14	0.63	0.09	0.39	0.00	0.01	0.03	0.14	2.82E-03	0.01	0.27	1.18

	Combustion HAPs - Organics					
	Benzene	Dichlorobenzene	Formaldehyde	Hexane	Toluene	**Total - Organics**
Emission Factor in lb/MMcf	2.1E-03	1.2E-03	Included Above	1.8E+00	3.4E-03	
Potential Emission in tons/yr	4.779E-04	2.731E-04		4.097E-01	7.738E-04	**4.112E-01**

	Combustion HAPs - Metals					
	Lead	Cadmium	Chromium	Manganese	Nickel	**Total - Metals**
Emission Factor in lb/MMcf	5.0E-04	1.1E-03	1.4E-03	3.8E-04	2.1E-03	
Potential Emission in tons/yr	1.138E-04	2.503E-04	3.186E-04	8.648E-05	4.779E-04	**1.247E-03**

Notes: Design heat inputs of direct fired dryer and of thermal oxidizer provided by the manufacturer (ICM, Inc.).

(a) Maximum short-term distiller's dry grain (DDG) production rate taken from facility information. Capacity of proposed system will be equivalent to combined capacity of the existing steam-tube dryers (portion of existing EU-32). Material balance is as follows:

(b)

	(lb/hr)	%solids
Dryer feed	35,508	35.5%
Water / Evaporation	21,508	0%
DDG Production	14,000	90%

Annual operations assume that the proposed dryer will operate at capacity continuously throughout the year.

Dryer uncontrolled emission factors and cyclone/thermal oxidizer control efficiencies provided by the manufacturer (ICM, Inc.). Assume PM/PM_{10} emissions are equivalent. Under the Part 70

(c) Dryer uncontrolled emission factors and thermal oxidizer control efficiencies provided by the manufacturer (ICM, Inc.). Emission factors for specific HAPs include both process emissions

Methodology:

(d) NOx and CO:

Uncontrolled PTE (lb/hr) = [Uncontrolled Emission Factor (lb/MMBtu) x Design Firing Rate (MMBtu/hr)]

Uncontrolled PTE (ton/yr) = [Uncontrolled Emission Factor (lb/MMBtu) x Design Firing Rate (MMBtu/yr) / 2,000 lb/ton]

SO2:

Uncontrolled PTE (lb/hr) = [Uncontrolled Emission Factor (lb/ton DDG) x Production Rate (ton/hr)]

Uncontrolled PTE (ton/yr) = [Uncontrolled Emission Factor (lb/ton DDG) x Production Rate (ton/yr) / 2,000 lb/ton]

VOC, PM/PM10/PM2.5:

Uncontrolled PTE (lb/hr) = [Uncontrolled Emission Factor (lb/ton DDG) x Production Rate (ton/hr)]

Uncontrolled PTE (ton/yr) = [Uncontrolled Emission Factor (lb/ton DDG) x Production Rate (ton/yr) / 2,000 lb/ton]

Controlled PTE (lb/hr) = [Uncontrolled Emission Rate (lb/hr) x (1 - Control Efficiency)]

Controlled PTE (ton/yr) = [Uncontrolled Emission Rate (ton/yr) x (1-Control Efficiency)]

HAPs (lb/ton emission factor):

Uncontrolled PTE (lb/hr) = [Uncontrolled Emission Factor (lb/ton DDG) x Production Rate (ton/hr)]

Uncontrolled PTE (ton/yr) = [Uncontrolled Emission Factor (lb/ton DDG) x Production Rate (ton/yr) / 2,000 lb/ton]

Controlled PTE (lb/hr) = [Uncontrolled Emission Rate (lb/hr) x (1 - Control Efficiency)]

Controlled PTE (ton/yr) = [Uncontrolled Emission Rate (ton/yr) x (1-Control Efficiency)]

HAPs (lb/MMcf emission factor):

Emission Factors are from AP 42, Chapter 1.4, Tables 1.4-1, 1.4-2, 1.4-3, SCC #1-02-006-02, 1-01-006-02, 1-03-006-02, and 1-03-006-03

Emission (tons/yr) = Throughput (MMCF/yr) x Emission Factor (lb/MMCF)/2,000 lb/ton

Greenhouse Gas Calculations

	Greenhouse Gas		
	CO2	CH4	N2O
Emission Factor in lb/MMcf	120,000	2.3	2.2
Potential Emission in tons/yr	27,311	0.52	0.50
Summed Potential Emissions in tons/yr	27,312		
CO2e Total in tons/yr	27,473		

Methodology

The N2O Emission Factor for uncontrolled is 2.2. The N2O Emission Factor for low NOx burner is 0.64.

Emission Factors are from AP 42, Table 1.4-2 SCC #1-02-006-02, 1-01-006-02, 1-03-006-02, and 1-03-006-03.

Global Warming Potentials (GWP) from Table A-1 of 40 CFR Part 98 Subpart A.

Emission (tons/yr) = Throughput (MMCF/yr) x Emission Factor (lb/MMCF)/2,000 lb/ton

CO2e (tons/yr) = CO2 Potential Emission ton/yr x CO2 GWP (1) + CH4 Potential Emission ton/yr x CH4 GWP (25) + N2O

Appendix B: Emissions Calculations
Wet Pad (EU-40)

Company Name: MGPI of Indiana, LLC
Address: 7 Ridge Avenue, Lawrenceburg, Indiana 47025
Significant Source Modification No.: 029-35496-00005
Significant Permit Modification No.: 029-35505-00005
Reviewer: Kristen Willoughby
Date: 12/22/2014

Emission Unit	Emission Point[a]	Uncontrolled Emission Factors[b]		0.0083 lb/ton wet cake		0.0001 lb/ton wet cake		0.00002 lb/ton wet cake		0.0002 lb/ton wet cake		0.00004 lb/ton wet cake		Total Emissions
		Dryer Feed[c]		VOC[d]		Acetaldehyde[d]		Acrolein[d]		Formaldehyde[d]		Methanol[d]		
		(ton/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)
EU-40	Wet Cake Production, Storage, and Loadout	24.56	215,154	0.20	0.89	0.002	0.0108	0.0005	0.0022	0.005	0.022	0.001	0.0043	0.009

Notes:
(a) VOC and HAP emissions can result during periods of dryer start-up and shutdown, when the dryer throughput may be diverted to a wet pad so that wet feed is not sent to dry storage.
(b) Emission factor for wet cake taken from a similar operation permitted in Indiana under Permit #T095-30443-00127 (POET Biorefining - Alexandria).
(c) Hourly dryer feed is maximum as taken from the material balance provided by ICM dated 1/30/2015.
(d) Methodology and Sample Calculations:
Emission rate (lb/hr) = Dryer Feed (ton/hr) X Wet Cake Emission factor (lb/ton)
Emission rate (ton/yr) = Dryer Feed (ton/yr) X Wet Cake Emission factor (lb/ton) x ton/2,000 lb

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11	**l HAP**
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14	**(ton/yr)**
15	0.0387
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Appendix B: Emissions Calculations

DDG Cooler and Transport System Projected Emission Estimates (EU-32)

Company Name: MGPI of Indiana, LLC
Address: 7 Ridge Avenue, Lawrenceburg, Indiana 47025
Significant Source Modification No.: 029-35496-00005
Significant Permit Modification No.: 029-35505-00005
Reviewer: Kristen Willoughby
Date: 12/22/2014

Emission Unit	Emission Point	Description	Stack ID	Uncontrolled PM Emission Factor	Uncontrolled PM_{10} Emission Factor	Uncontrolled $PM_{2.5}$ Emission Factor	DDG throughput		Uncontrolled PM Emission Rate		Uncontrolled PM_{10} Emission Rate		Uncontrolled $PM_{2.5}$ Emission Rate
				(lb/ton)	(lb/ton)	(lb/ton)	(ton/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)
EU-32	4 Screw Conveyors, 2 Drag Conveyors, 3 Product Conveyors, 1 K-Valve	Grain Conveying	S-310	0.061	0.034	0.0058	9.56	83,754	0.58	2.55	0.33	1.42	0.06
	Drum Cooler	Grain Conveying	NA	0.061	0.034	0.0058			0.58	2.55	0.33	1.42	0.06
								Totals	**1.17**	**5.11**	**0.65**	**2.85**	**0.11**

Emission Unit	Emission Point	Description	Stack ID	Controlled PM Emission Factor	Controlled PM_{10} Emission Factor	Controlled $PM_{2.5}$ Emission Factor	DDG throughput		Controlled PM Emission Rate		Controlled PM_{10} Emission Rate		Controlled $PM_{2.5}$ Emission Rate
				(lb/ton)	(lb/ton)	(lb/ton)	(ton/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)
EU-32	Hammer Mill	Hammer Milling[(b)]	S-310	0.067	0.052	0.036	9.56	83,754	0.64	2.81	0.49	2.16	0.35
								Totals	**0.64**	**2.81**	**0.49**	**2.16**	**0.35**

Methodology:

(a) Factors taken from AP-42, Fifth Edition, Volume 1, Section 9.9.1 (Grain Elevators and Processes).

(b) As recommended by AP-42 Appendix B.2, Table B.2.2 for Category 7 - "Grain Processing" on Page 17, the particle size distribution for PM_{10} is 61% of Total PM and for $PM_{2.5}$ is 23% of Total PM for uncontrolled emissions. Additionally, AP-42 Appendix B.2, Table B.2.3 "Typical

PM Size Range	Uncontrolled wt%	Collection Efficiency	Controlled Wt	Controlled wt%
$PM_{2.5}$	23%	80%	0.046	54%
$PM_{2.5}$ to PM_{10}	38%	95%	0.019	22%
PM_{10} and higher	39%	95%	0.0195	23%
	1		0.0845	
		Overall control:	91.6%	

(c) Methodology:

Uncontrolled PTE (lb/hr) = [Uncontrolled Emission Factor (lb/ton DDG) x Production Rate (ton/hr)]
Uncontrolled PTE (ton/yr) = [Uncontrolled Emission Factor (lb/ton DDG) x Production Rate (ton/yr) / 2,000 lb/ton]
Controlled PTE Hammermill (lb/hr) = [Controlled Emission Factor (lb/ton DDG) x Production Rate (ton/hr)]
Controlled PTE Hammermill (ton/yr) = [Controlled Emission Factor (lb/ton DDG) x Production Rate (ton/yr) / 2,000 lb/ton]
Uncontrolled PTE PM2.5 Hammermill (lb/hr) = Controlled PTE Hammermill (lb/hr) / (1 - 80%)
Uncontrolled PTE PM/PM10 Hammermill (lb/hr) = Controlled PTE Hammermill (lb/hr) / (1 - 95%)
Uncontrolled PTE PM2.5 Hammermill (ton/yr) = Controlled PTE Hammermill (ton/yr) / (1 - 80%)
Uncontrolled PTE PM/PM10 Hammermill (ton/yr) = Controlled PTE Hammermill (ton/yr) / (1 - 95%)

Emission Unit	Emission Point	Description	Uncontrolled Emission Factors[a] DDG throughput (ton/hr)	DDG throughput (ton/yr)	0.219 lb/ton DDG VOC (lb/hr)	VOC (ton/yr)	0.016 lbs/ton DDG Acetaldehyde (lb/hr)	Acetaldehyde (ton/yr)	0.00033 lbs/ton DDG Acrolein (lb/hr)	Acrolein (ton/yr)	0.010 lbs/ton DDG Formaldehyde (lb/hr)	Formaldehyde (ton/yr)	0.0 lbs/to Meth (lb/hr)
EU-32	Drum Cooler	Cooling Drum Apparatus	9.56	83,754	2.09	9.16	0.16	0.69	0.0031	0.014	0.10	0.43	0.034
	Existing Screw Conveyor	Grain Conveying											
	New 3 Screw Conveyors, 2 Drag Conveyors, 3 Product Conveyors, 1 K-Valve	Grain Conveying											
	Existing Hammer Mill and Cyclone	Hammer Milling											

Methodology:

(a) VOC emission factor for DDG cooling taken from a similar operation permitted in Indiana under Permit #T169-31191-00068 (POET Biorefining - North Manchester). HAP emission factors are derived as a percentage of the VOC emission factor presented, assuming that individual HAPs are e

(b) Methodology:

Emission rate (lb/hr) = DDG Throughput (ton/hr) X DDG Cooling Emission factor (lb/ton)

Emission rate (ton/yr) = DDG Throughput (ton/yr) X DDG Cooling Emission factor (lb/ton) x ton/2,000 lb

Dryer emissions

	tpy from Drying	% of VOC
VOC	8.38	--
Acetaldehyde	0.63	7.50%
Acrolein	0.01	0.15%
Formaldehyde	0.39	4.65%
Methanol	0.14	1.65%

Other DDG Cooler Emission Factors

POET Biorefining - N Manchester

5.685 lb VOC/hr

26 ton DDG/hr

0.218653846 lb VOC / ton DDG

From June 2004 testing at POET-Biorefining Jewell (IA)

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11	**ntrolled mission ate**	**Controlled PM Emission Rate**		**Controlled PM_{10} Emission Rate**		**Controlled $PM_{2.5}$ Emission Rate**	
12	**(ton/yr)**	**(lb/hr)**	**(ton/yr)**	**(lb/hr)**	**(ton/yr)**	**(lb/hr)**	**(ton/yr)**
13	0.24	0.09	0.38	0.05	0.21	0.01	0.04
14	0.24	0.58	2.55	0.33	1.42	0.06	0.24
15	**0.49**	**0.67**	**2.94**	**0.37**	**1.64**	**0.06**	**0.28**
16							
17	**rolled mission ate**	**Uncontrolled PM Emission Rate**		**Uncontrolled PM_{10} Emission Rate**		**Uncontrolled $PM_{2.5}$ Emission Rate**	
18	**(ton/yr)**	**(lb/hr)**	**(ton/yr)**	**(lb/hr)**	**(ton/yr)**	**(lb/hr)**	**(ton/yr)**
19	1.53	12.81	56.12	9.86	43.17	1.74	7.64
20	**1.53**	**12.81**	**56.12**	**9.86**	**43.17**	**1.74**	**7.64**
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42	**036**	**Total HAP Emissions**					
43	**n DDG**						
44	**hanol**						
45	**(ton/yr)**	**(lb/hr)**	**(ton/yr)**				
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47	0.15	0.292	1.28				
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51							
52	emitted in the same proportion						
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	D	E	F
1	**Appendix B: Emissions Calculations**		
2	**EU-32 Rotary Dryer Baseline Emissions**		
3			
4	**Company Name:**	**MGPI of Indiana, LLC**	
5	**Address:**	**7 Ridge Avenue, Lawrenceburg, Indiana 47025**	
6	**nt Source Modification No.:**	**029-35496-00005**	
7	**nt Permit Modification No.:**	**029-35505-00005**	
8	**Reviewer:**	**Kristen Willoughby**	
9	**Date:**	**12/22/2014**	

EU-32 Rotary Dryers

PM, PM_{10}, $PM_{2.5}$ Emissions

Constituent	Dryer Feed Rate[(a)] (ton/yr)	Controlled Emission Factor[(b)] (lb/ton)	Controlled Emissions[(c)] (ton/yr)
PM	158,894	0.27	21.45
PM10		0.27	21.45
PM2.5		0.27	21.45

Notes:

(a) Feed (wet cake) into existing steam tube dryer system is taken from facility records as the average over the 24-month period from January 2013 - December 2014.

(b) Controlled emission Factor from AP-42, Table 9.9.7-1. The emission estimation methodology used matches that provided in the IDEM

(c) Methodology:
Controlled Emissions (ton/yr) = Usage (ton/yr) x EF (lb/ton) / 2,000 lb/ton
PM2.5 emissions conservatively assumed to be equal to PM10 emissions.

VOC Emissions

Dryer Feed Rate (ton/yr)	Water Content[(b)] (% by wt)	VOC Content of Water[(b)] (lb VOC/lb water)	VOC from Dryers (ton/yr)
158,894	66.66%	0.006	635.51

Notes:

(a) Feed (wet cake) into existing steam tube dryer system is taken from facility records as the average over the the 24-month period from

(b) Water content (% wt) and VOC content of water (lb VOC/lb water) taken from May 22, 2014 ATSD, Appendix A, Page 8 of 23, for permit

(c) Methodology and Sample Calculations:
VOC (ton/yr) = Dryer Feed Rate (ton/yr) x Water Content of Feed (% by wt) x (lb VOC/lb water)

	D	E	F
1	**Appendix B: Emissions Calculations**		
2	**EU-32 Rotary Dryer Projected Actual Emissions**		
3			
4	**Company Name:**	**MGPI of Indiana, LLC**	
5	**Address:**	**7 Ridge Avenue, Lawrenceburg, Indiana 47025**	
6	**ce Modification No.:**	**029-35496-00005**	
7	**nit Modification No.:**	**029-35505-00005**	
8	**Reviewer:**	**Kristen Willoughby**	
9	**Date:**	**12/22/2014**	

EU-32 Steam Tube Rotary Dryers

PM, PM_{10}, $PM_{2.5}$ Emissions

Constituent	Dryer Feed Rate[(a)] (ton/yr)	Controlled Emission Factor[(b)] (lb/ton)	Controlled Emissions[(c)] (ton/yr)	Uncon Emiss (tor
PM	147,000	0.27	19.8	13
PM10		0.27	19.8	13
PM2.5		0.27	19.8	13

Notes:

(a) Feed (wet cake) into existing steam tube dryer system is based on operation as back-up to the proposed direct-fired dryer.

(b) Controlled emission Factor from AP-42, Table 9.9.7-1. The emission estimation methodology used matches that provided in the IDEM c

(c) Methodology:
Controlled Emissions (ton/yr) = Usage (ton/yr) x EF (lb/ton) / 2,000 lb/ton
PM2.5 emissions conservatively assumed to be equal to PM10 emissions.

(d) Uncontrolled emissions estimated based on an 85% control efficiency for controlled emissions.
$PM_{2.5}$ emissions conservatively assumed to be equal to PM_{10} emissions.

VOC Emissions

Dryer Feed Rate (ton/hr)	Water Content[(b)] (% by wt)	VOC Content of Water[(b)] (lb VOC/lb water)	VOC from Dryers (ton/yr)
147,000	66.66%	0.006	587.9

Notes:

(a) Feed (wet cake) into existing steam tube dryer system is based on operation as back-up to the proposed direct-fired dryer.

(b) Water content (% wt) and VOC content of water (lb VOC/lb water) taken from May 22, 2014 ATSD, Appendix A, Page 8 of

(c) Methodology:
VOC (ton/yr) = Dryer Feed Rate (ton/yr) x Water Content of Feed (% by wt) x (lb VOC/lb water)

HAP Emissions

HAP	HAP%[(a)] (by wt of VOC)	HAP from Dryers (ton/yr)
Acetaldehyde	6.18%	36.3
Acrolein	0.37%	2.2
Methanol	1.24%	7.3
Formaldehyde	0.04%	0.2
Total		46.0

Notes:

	A	B	C	D	E	F	G
48	(a)	HAP composition taken from May 22, 2014 ATSD, Appendix A, Page 8 of 23, for permit T029-32119-00005.					

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